

PATENT

Attorney Docket No.: APT-476303.02/CPI/COPPER/PJS  
Express Mail No. EL 804719665 US

**Claims:**

1. A target for physical vapor deposition of a seed layer, comprising:  
copper; and  
a metal selected from the group consisting of aluminum, magnesium, titanium, zirconium, tin, and combinations thereof, wherein the metal is present in the target in a concentration between about 0.001 atomic percent and about 5.0 atomic percent.
2. The target of claim 1, wherein the metal is present in the target in a concentration between about 0.01 atomic percent and about 2.0 atomic percent.
3. The target of claim 1, wherein the metal is present in a concentration between about 0.1 atomic percent and about 1.0 atomic percent.
4. A chamber adapted to deposit a seed layer, comprising:  
a target comprising copper and a metal selected from the group consisting of aluminum, magnesium, titanium, zirconium, tin, and combinations thereof, wherein the metal is present in the target in a concentration between about 0.001 atomic percent and about 5.0 atomic percent.
5. The chamber of claim 4, wherein the metal is present in the target in a concentration between about 0.01 atomic percent and about 2.0 atomic percent.
6. The chamber of claim 4, wherein the metal is present in a concentration between about 0.1 atomic percent and about 1.0 atomic percent.
7. A system for processing a substrate, comprising:  
a first chamber for depositing a copper alloy seed layer, wherein the copper alloy seed layer comprises copper and a metal selected from the group consisting of aluminum, magnesium, titanium, zirconium, tin, and combinations thereof and wherein the metal is present in the copper alloy in a concentration between about 0.01 atomic percent and about 2.0 atomic percent.
8. The system of claim 7, further comprising a second chamber for depositing a

PATENT

Attorney Docket No.: AP-146303.02/CPI/COPPER/PJS  
Express Mail No. EL 804719665 US

barrier layer, wherein the copper alloy seed layer is deposited over the barrier layer.

*sub A2*

9. The system of claim 7, wherein the first chamber is selected from the group consisting of a physical vapor deposition chamber, a chemical vapor deposition chamber, an atomic layer deposition chamber, and an electroless deposition chamber.

10. The system of claim 8, wherein the second chamber is selected from the group consisting of an atomic layer deposition chamber, a chemical vapor deposition chamber, and a physical vapor deposition chamber.

*sub A3*

11. The system of claim 8, wherein the first chamber is a physical vapor deposition chamber and the second chamber is an atomic layer deposition chamber.

*sub A4*

12. The system of claim 8, further comprising a transfer chamber in communication with the first chamber and the second chamber.

13. The system of claim 8, wherein at least two of the chambers are a single chamber.

*sub A4*

14. A system for processing a substrate, comprising:  
a first chamber for depositing a copper alloy seed layer, wherein the copper alloy seed layer comprises copper and a metal selected from the group consisting of aluminum, magnesium, titanium, zirconium, tin, and combinations thereof, and  
a second chamber for depositing an undoped copper seed layer over the copper alloy seed layer.

15. The system of claim 14, further comprising a third chamber for depositing a barrier layer, wherein the copper alloy seed layer is deposited over the barrier layer.

*sub A5*

16. The system of claim 14, wherein the first chamber is selected from the group consisting of a physical vapor deposition chamber, a chemical vapor deposition chamber, an atomic layer deposition chamber, and an electroless deposition chamber.

*Concert  
A5*

17. The system of claim 14, wherein the second chamber is selected from the group consisting of a physical vapor deposition chamber, a chemical vapor deposition chamber, an atomic layer deposition chamber, and an electroless deposition chamber.

*sub A4*

18. The system of claim 15, wherein the third chamber is selected from the group consisting of an atomic layer deposition chamber, a chemical vapor deposition chamber, and a physical vapor deposition chamber.

*sub A4*

19. The system of claim 15, wherein the first chamber is a physical vapor deposition chamber, the second chamber is a physical vapor deposition chamber, and the third chamber is an atomic layer deposition chamber.

*sub A4*

20. The system of claim 15, further comprising a transfer chamber in communication with the first chamber, the second chamber, and the third chamber.

*sub A4*

21. The system of claim 15, wherein at least two of the chambers are a single chamber.

*sub A1*

22. A system for processing a substrate, comprising:  
a first chamber for depositing a metal seed layer, wherein the metal seed layer comprises a metal selected from the group consisting of aluminum, magnesium, titanium, zirconium, tin, and combinations thereof, and  
a second chamber for depositing an undoped copper seed layer over the metal seed layer.

*sub A8*

23. The system of claim 22, further comprising a third chamber for depositing a barrier layer, wherein the metal seed layer is deposited over the barrier layer.

*sub A8*

24. The system of claim 22, wherein the first chamber is selected from the group consisting of a physical vapor deposition chamber, a chemical vapor deposition chamber, an atomic layer deposition chamber, and an electroless deposition chamber.

*sub A8*

25. The system of claim 22, wherein the second chamber is selected from the group

consisting of a physical vapor deposition chamber, a chemical vapor deposition chamber, an atomic layer deposition chamber, and an electroless deposition chamber.

26. The system of claim 23, wherein the third chamber is selected from the group consisting of an atomic layer depositing chamber, a chemical vapor deposition chamber, and a physical vapor deposition chamber.

27. The system of claim 23, wherein the first chamber is a physical vapor deposition chamber, the second chamber is a physical vapor deposition chamber, and the third chamber is an atomic layer deposition chamber.

28. The system of claim 23, further comprising a transfer chamber in communication with the first chamber, the second chamber, and the third chamber.

29. The system of claim 23, wherein at least two of the chambers are a single chamber.